

WHAT IS CLAIMED IS:

1. A communication hub for providing information communication between a plurality of locations, said communication hub comprising:

a first radio frequency modem providing a first signal;

5 a plurality of hub antenna units, each hub antenna unit having a predetermined radiation pattern to provide directional communication, each hub antenna unit adapted for air link communication in a frequency band of the millimeter wave spectrum of frequencies, said plurality of hub antenna units including a first group having at least one hub antenna unit associated therewith; and

10 switching means for switchably connecting said first group to said first signal, said switching means providing said first group time division multiple access to said first signal.

2. The communication hub of claim 1, further comprises:

5 a second group having at least one hub antenna associated therewith, wherein said first and second groups are not mutually exclusive; and

a second radio frequency modem providing a second signal, and said switching means further comprise means for switchably connecting said second group to said second signal, said switching means providing said second group time division multiple access to said second signal.

3. The communication hub of claim 1, wherein a first set of hub antenna units of said plurality of antenna units are adapted to communicate via a first frequency band of the millimeter wave spectrum of frequencies, and a second set of hub antenna units of said plurality of antenna units are adapted to communicate via a second frequency band of the millimeter wave spectrum of frequencies.

4. The communication hub of claim 1, wherein said hub is adapted to accept the coupling of an individual antenna unit thereto, said coupled individual antenna unit thereby becoming a hub antenna of said plurality of hub antennas units.

5. The communication hub of claim 4, wherein said coupled individual antenna unit is disposed to provide directional communication to an area previously not within a composite antenna unit radiation pattern provided by said communication hub.

6. The communication hub of claim 4, wherein said coupled individual antenna unit is disposed to provide directional communication to an area previously within a composite antenna unit radiation pattern provided by said communication hub, said coupled individual antenna unit being adapted to provide increased communication capacity in said area.

7. The communication hub of claim 1, wherein said first signal is time divided to include a plurality of information bursts.

8. The communication hub of claim 7, wherein said plurality of information bursts include a set of forward channel information bursts and a set of reverse channel information bursts, said forward and reverse channel information bursts each defined to comprise a percentage of said plurality of information bursts, which together represent 5 100%.

9. The communication hub of claim 8, wherein said forward channel and said reverse channel percentages are selected from the group consisting of:  
approximately 94% forward channel information bursts and approximately 6% reverse channel information bursts;

approximately 50% forward channel information bursts and approximately 50% reverse channel information bursts; and

approximately 6% forward channel information bursts and approximately 94% reverse channel information bursts.

10. The communication hub of claim 1, wherein said switchable connection is accomplished according to a predefined regimen to provide time division multiple access of said first signal to said first group of antenna units.

11. The communication hub of claim 10, wherein said predefined regimen is determined at least in part by an attribute of said communication provided by ones of said plurality of antenna units.

12. The communication hub of claim 1, wherein said first modem is dynamically configurable to provide variable information density within said first signal.

13. The communication hub of claim 12, wherein said variable information density includes quadrature amplitude modulation of an input signal.

14. The communication hub of claim 12, wherein said variable information density is dynamically configured at least in part as a function of an attribute of said communication provided by ones of said plurality of antenna units.

15. The communication hub of claim 14, wherein said attribute of said communication is selected from the group consisting of:

- an error rate of receive signal;
- a signal to noise ratio of said communication;
- a signal to interference ratio of said communication;

a power level of a receive signal;  
a distance of said communication; and  
a signal propagation of said communication.

16. The communication hub of claim 1, wherein said hub is disposed to provide communication in a predefined cell of a cellular overlay pattern including a plurality of communications hubs.

17. The communication hub of claim 16, wherein said hub is coupled to at least one hub of said plurality of hubs via a communications backbone.

18. The communication hub of claim 17, wherein said communications backbone is selected from the group consisting of:

a public switched network;  
a cable communication network;  
a broadband data grade connection; and  
the Internet.

19. The communication hub of claim 16, wherein said hub is in information communication with at least one hub of said plurality of hubs via an air link provided at least in part by an antenna unit of said plurality of antenna units.

20. The communication hub of claim 1, wherein said frequency band of the millimeter wave spectrum of frequencies is within 10 to 60 GHz.

21. The communication hub of claim 1, wherein ones of said plurality of hub antennas comprise a hybrid mode lens corrected horn providing approximately 32 to 38 dB

of gain with a predetermined communication lobe of approximately 4 to 20 degrees, operating within 10 to 60 GHz.

22. A hub for providing information communication between a plurality of locations, said hub comprising:

5 a plurality of hub antenna units, each hub antenna unit having a predetermined radiation pattern to provide directional communication, each hub antenna unit adapted for air link communication in a frequency band of the millimeter wave spectrum of frequencies, said plurality of hub antenna units including a first group having at least one hub antenna unit associated therewith; and

circuity switchably connecting said first group to a first signal, said circuitry providing said first group time division multiple access to said first signal, wherein said time division multiple access includes a plurality of information bursts having a set of forward channel information bursts and a set of reverse channel information bursts, said set of forward and reverse channel information bursts each adaptively defined to comprise a percentage of said plurality of information bursts.

23. The hub of claim 22, further comprises:

10 a second group having at least one hub antenna associated therewith, wherein said first and second groups are not mutually exclusive; and

5 a second radio frequency modem providing a second signal, and said circuitry connecting said second group to said second signal, said circuitry providing said second group time division multiple access to said second signal.

24. The hub of claim 22, wherein said hub is adapted to accept the coupling of an individual antenna unit thereto, said coupled individual antenna unit thereby becoming a hub antenna of said plurality of hub antennas units.

25. The hub of claim 24, wherein said coupled individual antenna unit is disposed to provide directional communication to an area previously not within a composite antenna unit radiation pattern provided by said hub.

26. The hub of claim 24, wherein said coupled individual antenna unit is disposed to provide directional communication to an area previously within a composite antenna unit radiation pattern provided by said hub, said coupled individual antenna unit being adapted to provide increased communication capacity in said area.

27. The hub of claim 22, wherein said forward channel and said reverse channel percentages are selected from the group consisting of:

approximately 94% forward channel information bursts and approximately 6% reverse channel information bursts;

approximately 50% forward channel information bursts and approximately 50% reverse channel information bursts; and

approximately 6% forward channel information bursts and approximately 94% reverse channel information bursts.

28. The hub of claim 22, wherein said first modem is dynamically configurable to provide variable information density within said first signal.

29. The hub of claim 28, wherein said variable information density includes quadrature amplitude modulation of an input signal.

30. The hub of claim 28, wherein said variable information density is dynamically configured at least in part as a function of an attribute of said communication provided by ones of said plurality of antenna units.

31. The hub of claim 30, wherein said attribute of said communication is selected from the group consisting of:

- 5 an error rate of receive signal;
- a signal to noise ratio of said communication;
- a signal to interference ratio of said communication;
- a power level of a receive signal;
- a distance of said communication; and
- a signal propagation of said communication.

32. The hub of claim 22, wherein said hub is disposed to provide communication in a predefined cell of a cellular overlay pattern including a plurality of communications hubs.

33. The hub of claim 32, wherein said hub is coupled to at least one hub of said plurality of hubs via a communications backbone.

34. The hub of claim 32, wherein said hub is in information communication with at least one hub of said plurality of hubs via an air link provided at least in part by an antenna unit of said plurality of antenna units.

35. The hub of claim 22, wherein said frequency band of the millimeter wave spectrum of frequencies is within 10 to 60 GHz.

36. A method for providing information communication between a plurality of locations, said comprising the steps of:

5 providing a plurality of antenna units each having a predetermined radiation pattern to provide directional communication adapted for air link communication in a frequency band of the millimeter wave spectrum of frequencies;

switchably connecting ones of said antenna units to a first signal to provide time division multiple access to said first signal, wherein said time division multiple access includes a plurality of information bursts having a set of forward channel information bursts and a set of reverse channel information bursts; and

10 adaptively adjusting a portion of said time division multiple access associated with said set of forward channel information bursts inversely with a portion of said time division multiple access associated with said reverse channel information bursts.

37. The method of claim 36, wherein said portion of said time division multiple access associated with said forward channel and said portion of said time division multiple access associated with said reverse channel are selected from the group consisting of:

5 approximately 94% forward channel information bursts and approximately 6% reverse channel information bursts;

approximately 50% forward channel information bursts and approximately 50% reverse channel information bursts; and

10 approximately 6% forward channel information bursts and approximately 94% reverse channel information bursts.